

Total Logistics Support

LV50 Integrated Turbine Power Pack System For the Future Combat System

Abstract

The LV50 Integrated Turbine Power Pack System provides several operational, tactical and cost advantages for the Future Combat System.

Total Logistics Support

LV50 Provides Lowest Total Ownership Costs

Honeywell's LV50 Integrated Turbine Power Pack System for the hybrid electric Future Combat System (FCS) will provide the lowest total cost of ownership and the smallest deployable logistics footprint to the U.S. Army. This is accomplished through the system's high power-to-weight ratio, versatile mission design options for logistics, high reliability and efficient maintainability. The LV50 system will ease the logistics burden of deploying and sustaining FCS vehicles.

High Power Density Creates Payload Advantages

The Honeywell LV50 Integrated Turbine Power Pack System provides significant weight and volume advantages compared to a diesel engine system in the same power class. The LV50 system is 1,000 to 1,200 pounds lighter and significantly smaller than a comparable diesel system; both benefits are derived from inherent turbine technology. This enables the LV50 system to be installed in the sponson, providing a space advantage of at least 24 cubic feet. This volume advantage enables a vehicle design option to further reduce the overall vehicle system size and provide additional weight reduction of 800-1,200 pounds.

Payload Advantages Provide Logistics and System Flexibility

The significant weight (1,000-1,200 pounds) and volume (24 cubic feet) savings provide the U.S. Army the flexibility to carry one or a combination of the following incremental payloads on the FCS vehicle:

- Ammunition - 10-12 rounds of cannon ammunition (lethality)
- Armor - 40 square feet of armor (survivability)
- Fuel - 150 gallons of fuel (versatility)
- Water - 120 gallons of water (sustainability)

For example, the additional fuel payload option translates into 500 kilometers of extended range for a road march without resupply over a seven-day mission. An alternative option is to use the weight and volume savings to transport additional water if the LV50's integrated water recovery system that produces 3-5 gallons of water per engine operating hour is not completely utilized. This alternative provides more than 45,000 gallons (379 vehicles x 120 gallons) of potable water for a Unit of Action, which equates to 2.6 gallons of water, per soldier, per day, for a seven-day mission.

Longer Engine Maintenance Intervals Increase Vehicle Readiness Level

The LV50 system is derived from the proven commercial LTS101 turbine engine which currently has five platform applications and more than 7.5 million hours of accumulated operation. The anticipated maintenance interval for the LV50 is more than 5,000 hours Mean Time Between Depot Removals (MTBDR). This estimate is derived directly from experience with the proven LTS101 engine core. The inherent turbine technologies and advanced materials used in the LV50 minimize the impact of heat on engine operation and life. In comparison, a diesel engine has many frictional surfaces that are prone to wear out or generate heat that negatively affects engine operation and life. The LV50 system does not require periodic routine inspections, such as oil or coolant checks. The LV50's integrated physical health monitoring, enhanced diagnostics and an electronic logbook provide "go-no-go" engine recommendations and allow fast, cost-effective maintenance decisions. Honeywell, leveraging its long and extensive turbine maintenance experience, is designing an optimal logistics support plan for the LV50 system.

Quick Engine Field Removal and Replacement Minimize Vehicle Downtime

The LV50 system is being designed for a one-hour field removal and replacement requiring only common hand tools. This is made possible by the simple interfaces a turbine has with the vehicle and by incorporating quick disconnects at all interface connections. Since the turbine engine weighs only 580 pounds, it can easily be lifted by a hoist so a recovery vehicle is not required. This low-weight system translates into lighter and easy-to-remove Line Replaceable Units (LRUs) such as generators. The two LV50 generators weigh only 60 pounds each versus a diesel generator, which weighs more than 300 pounds.

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Turbine Provides Life Cycle Cost Advantage Over Diesel

The LV50 system is based on a commercial helicopter propulsion system (also used on the HH-65 Coast Guard helicopter) that demands high reliability to ensure safety of flight and a high power-to-weight ratio. These critical design requirements and inherent turbine technologies create a higher initial investment cost compared to a diesel engine in the same power class. At the same time the technology advantages of turbines provide lower operating and support costs over the longer life (40-50 years) of the turbine (e.g., Honeywell's T53 engine used on UH-1 helicopters, T55 engine used on CH-47 helicopter and AGT1500 engine used on the M1 Main Battle Tank). Scheduled maintenance events for turbines have longer intervals and require fewer parts than diesels. Higher turbine reliability translates into fewer scheduled maintenance events, which in turn translates into fewer required spare engines. Since the turbine has fewer parts to wear out compared to a diesel, the supply chain requirements are also smaller. Lower maintenance frequencies, lower part quantities and use of commercial dual-use parts keep inventory costs low and the logistics pipeline small and responsive. Honeywell's extensive experience has demonstrated that high turbine durability results in lower Life Cycle Costs (LCC).

Summary

The LV50 Integrated Turbine Power Pack System provides several significant advantages over a similar power class diesel for the FCS system:

- Weight – 1,800-2,400 pounds. system weight reduction (with vehicle size reduction)
- Volume - 24 cubic feet vehicle system volume reduction
- Fully integrated system - Engine, Generators, NBC, Thermal Management/ECS, Filtration
- Water recovery – 3-5 gallons of water per engine operating hour
- Maintainability – 5,000 hour MTBDR
- Durability – Battle-proven Abrams Main Battle Tank turbine experience
- Easy field remove and replace - One hour with common tools
- Proven Total Logistic Support experience - Several implemented defense programs
- Detectability - No Smoke, Low Noise, Low Heat
- Operational Range - From -65 to +140 degrees Fahrenheit
- Power Growth - 30% growth within same envelope
- Life Cycle Cost – Lower LCC through longer maintenance intervals, higher reliability, greater durability and easier maintenance

The above advantages combined with advanced technology, systems integration, design for ease of maintenance, quick field removal and replacement with common hand tools, and proven logistics support experience provide by far the smallest logistic footprint for the Future Combat System.